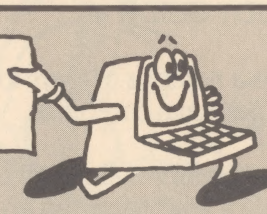
ACADEMY ON COMPUTERS

NEWSLETTER 3

In this issue...



Graphics: A Portrait of the Artist as a Young Programmer

Did you throw away your oils and brushes when you bought a computer? Find out how to express your artistic talent through bits and bytes on page 2.

Computer Music: Roll Over, Beethoven—But Not Yet

Computers and Music are a unique team. Read about this new combination of creativity and technology on page 3.

We Get Questions...

Our regular column that answers many of the questions we get through the ACADEMY hotline begins on page 4. If you're interested in what word processing can do for you—read all about it in this column.

Spreadsheets: A Valuable Business Application for Computers

The computer has replaced the green visor in business. For a description of spreadsheet software packages turn to page 6.

Hints on Buying a Computer

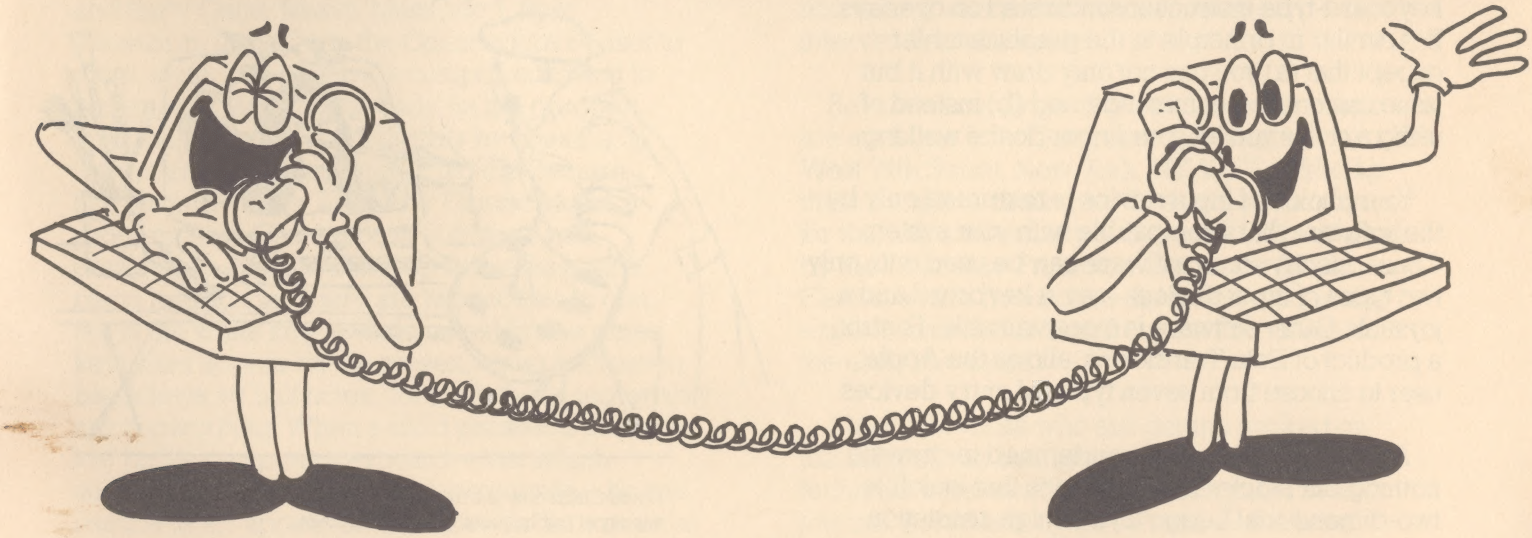
As the ACADEMY ON COMPUTERS nears the end, many of you will make the decision that you simply must purchase a microcomputer of your own. The ACADEMY offers advice on buying a computer on page 7.

Technological Update

Look for information about two new computers from Apple and IBM on page 9.

Bonus—Computer Programs for You

In Newsletter #2 we provided mortgage programs for the Commodore Pet, Commodore 64, TRS-80 and Apple computers. In this issue we are providing the same program for the Atari 400 and 800, Texas Instruments 99/4A and IBM PC computers. Turn to page 10 to figure your mortgage payments.



You may want to tell your friends and relatives that they haven't missed out on the opportunity to participate in the ACADEMY ON COMPUTERS. The ACADEMY will be repeated beginning in April, to be offered by forty public television stations across the country. Check your local station for the start date.

Graphics: A Portrait of the Artist as a Young Programmer

by David Chesanow

In program 9 of the "Bits and Bytes" television series computer graphics is discussed and displayed. Additional information on graphics is explained in Chapter 9 of the BITS AND BYTES STUDY GUIDE.

There are a number of ways to create works of art on your personal computer.

The most fundamental graphics program requires only a keyboard and no special software, but first it's necessary to prepare your computer for graphics display. Then, if you envision your screen as being divided into boxes, like a sheet of graph paper, you can "draw" pictures by using the cursor to designate each box to be colored in or to be filled with a particular graphics character (e.g., a heart or a diamond), depending upon the type of computer you're using. For example, a GR statement will put an Apple into graphics mode (ready to display filled-in boxes); a TAB statement will prepare a Commodore to display an arrangement of symbols. The user manual that came with your computer explains how to execute these commands.

Of course, your keyboard is only one way of manipulating the cursor: You may also use a mouse, a joystick, or paddles. Still another means of illustration is the graphics tablet, an electronic drawing pad that, when sketched upon with a special stylus, produces a corresponding image on the computer screen. Yet one more alternative input device is the KoalaPad Touch Tablet (see Newsletter #2), a hand-held screen with various keyboard-type instructions indicated on overlays. It is similar in principle to the graphics tablet except that (a) you can not only draw with it but issue customized commands, and (b) instead of using a stylus you let your finger do the walking.

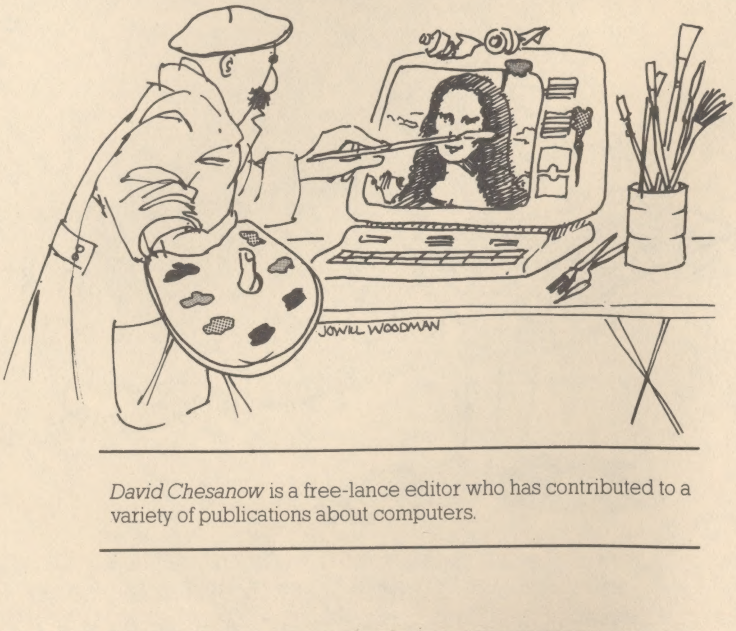
Your choice of input device is restricted only by the software that's compatible with your system. Consequently some software can be used with only two types of input device—say, a keyboard and a joystick. Other software is more versatile. Fontrix, a product of Data Transforms, allows the Apple user to choose from seven types of entry devices.

And don't think you're condemned to drawing nothing but blocky-looking things that look like two-dimensional Leggo toys. A high-resolution screen can produce a remarkable array of artistic effects. The MacPaint program for the brand-new Macintosh from Apple allows you to select from a huge assortment of changeable shapes, brush sizes, and shading patterns.

If your monitor is monochromatic, your graphics will be rendered in two colors, one light and one dark; if it's a color monitor, your artistic license is understandably much greater (the new Flying Colors software package, for use in the Apple II, II+, and IIe, allows you to choose from a spectrum of twenty hues, including two shades each of black and white).

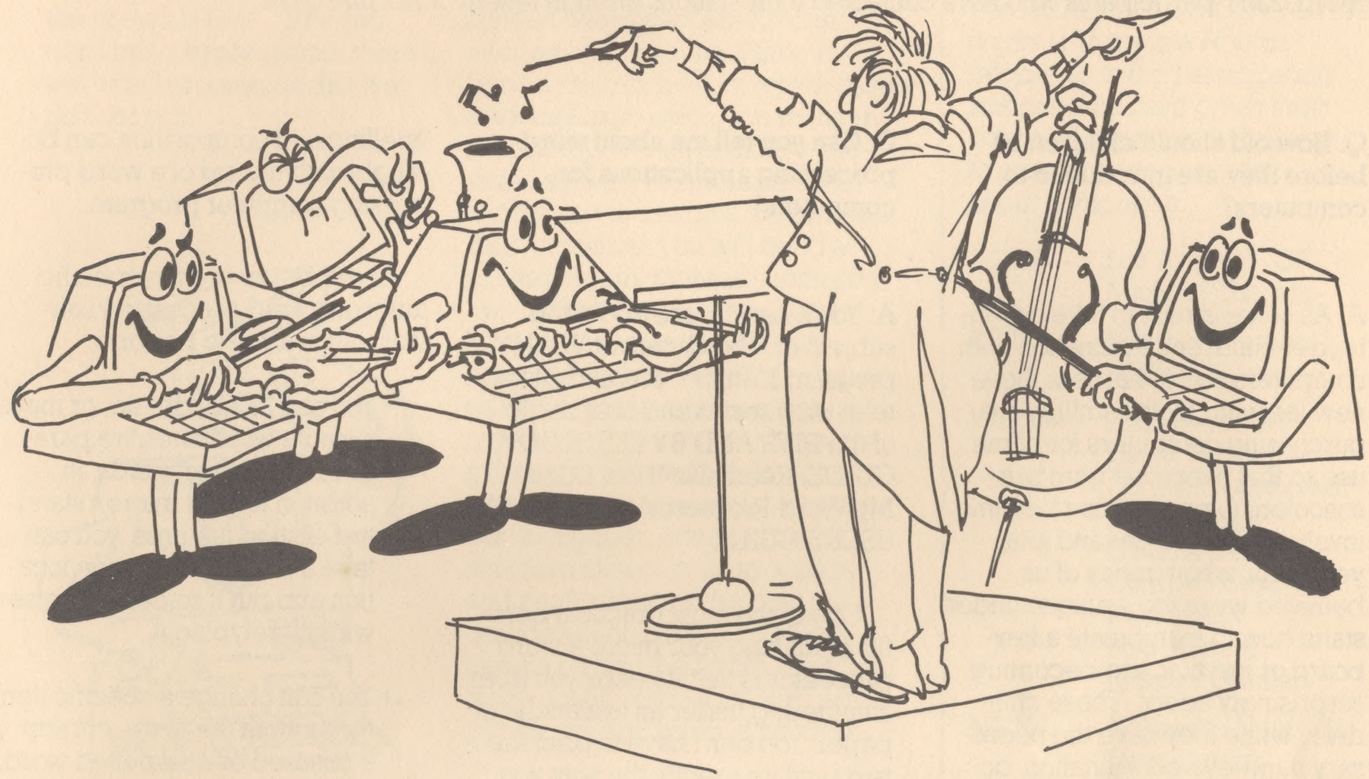
But static artwork is not all that you can produce. There is software that will allow you to construct three-dimensional images and then animate them. Animation software can automatically simulate an explosion when two shapes make contact. And, of course, there's a wonderful little feature called a sprite, which requires both special graphics hardware and software in order to materialize. A sprite is an animated character that can move independently of its background and without leaving an unsightly trail, therefore a sprite can be given the impression of movement without laborious redrawing. One can only speculate about the man-hours such a feature would have saved the young Walt Disney.

Be sure to check out the dozens of computer magazines now on the newsstands. Virtually all of them contain at least one article per issue on the latest hard- and software graphics capabilities, and some are wholly devoted to graphics.



David Chesanow is a free-lance editor who has contributed to a variety of publications about computers.

Computer Music: Roll Over Beethoven—But Not Yet



On program 10 of "Bits and Bytes" and in chapter 10 of the BITS AND BYTES STUDY GUIDE you get a brief, tantalizing look into the musical potential of the computer.

Although there is hardly an overabundance of music-oriented software at the moment, programs designed to teach as well as to encourage experimentation (kind of like micro jam sessions) are making their appearance on the home computer market. Two examples are MusiCalc 1 and Early Game Music. MusiCalc 1, from Waveform, Inc., allows the Commodore 64 user to write, store, and play back compositions and to accompany melodies already on the program. (The music is produced audibly by hooking up the system to a sound-producing mechanism, like an amplifier or TV.) Early Games Music, a program from Counterpoint Software, was designed to provide children with elementary piano instruction. There are two modes. In one, ten of the white keys (whole notes) from a piano keyboard appear on the screen, along with seven black keys, or half notes, although these regrettably are nonworking. When a child presses a particular key on his computer keyboard—that which corresponds with the F note for example—he will see the letter appear on the F key on the screen as well as hear the note being played. In Early Games Music's sheet-music mode, the pressing of specific keys results in the appearance of corresponding notes on a treble-clef staff on the screen.

At the same time, computers are changing the way we all *listen* to music. Pick up any album by your favorite group, and you're almost certain to hear computer elements in the music. On the more experimental fringes of the art, digital recording and playback technology now make it possible for music to be generated, recorded, disseminated, and heard, with no traditional acoustical intervention whatsoever.

Several recordings of "pure" computer music are available from Composers Recordings Inc., 170 West 74th Street, New York, NY 10023. Write for their complete catalogue. Or ask in particular for the 10th anniversary two-record set produced by the Columbia-Princeton Electronic Music Center, which documents the history of musical experiments in this form from the mid-fifties to the early seventies.

Finally, for those who are getting hooked on the subject, the best journal (quite academic and technical in orientation) is the *Computer Music Journal*, published by MIT Press, 28 Carleton Street, Cambridge, MA 02141.

We Get Questions...

And we do our best to provide answers through our special ACADEMY *hot lines* and in this column, a regular Newsletter feature. Here we'll respond to a selection of the general issues raised most frequently by those ACADEMY participants who have contacted their stations through letters or *hot line* calls.

Q: How old should children be before they are introduced to computers?

A: As schools rush to take advantage of children's fascination with computers and to harness these new learning tools, families are purchasing computers for home use so that everyone from preschoolers to parents can become involved. And three- and four-year-olds, whom many of us believed were too young to understand how to manipulate a keyboard or joystick, are becoming surprisingly adept. These children, while they have the necessary hand-eye coordination, do need the help of a parent to gain the most from experience with computers.

Many educational programs are available for this age group. Some allow the child to press any letter on the keyboard, and give instant feedback, responding with a picture and song for that letter. Confusing and unnecessary keys can be disabled, and the children can learn that the space bar can lead them through a series of choices on the screen and the RETURN key will then help them select their choice.

There are programs to develop spatial awareness, to reinforce knowledge of letters, colors, and numbers, and develop memory skills. Most of this software will lead to the skills needed for reading and working with numbers. If mom or dad works along with the young child, talking as they work, spoken language and communications skills can also be developed.

Q: Can you tell me about word processing applications for computers?

A: You'll learn more about this subject in "Computers at Work," program 11 in the "Bits and Bytes" television series and chapter 11 of the BITS AND BYTES STUDY GUIDE. Read also "How I Chose My Word Processor" in the HOME USER'S GUIDE.

One of the most practical benefits of making your micro a word processor is that it keeps you from smothering under an avalanche of paper. You don't have to print the text until it's exactly the way you want it, or until it's needed.

Text can be typed onto the screen, edited, revised, added to, updated—then stored on tape or disk. Later, you can load and read the material, make further changes as desired without retyping the entire document, and eventually print a final, letter-perfect copy—or as many copies as you like. Writers, researchers, and scholars can revise lengthy, complex documents many times before publication. Legal documents with both standard and variable ingredients can be assembled quickly. Form letters can be printed, with each copy containing a personalized address or message. In the classroom, spelling and composition can be taught with the aid of a word processing computer program.

Listed below are the specific functions word processing software allows you to perform:

- You can insert, delete, or move a single word or entire paragraphs; in other words, in addition to your micro's standard editing features, you can take a passage from one location and put it someplace else without retyping it.
- You can change a specific item throughout the text—correct a misused or misspelled word, for example—without reading through the whole thing yourself. Rather, you tell the computer what you want changed and it does the fixing for you.
- You can add the same piece of copy (say, a subhead, like "Summary") again and again throughout the text without retyping; you just tell the computer where to slip it in.
- You can perform typographical functions that are virtually impossible on a regular typewriter. For instance, you can change the width of your margins *after* you've finished typing (a neat trick if you have space requirements); align the words along both margins, not just the left one; center text on the page, rather than counting the letters and taking a guess; and underscore words or set them in italics or boldface without stopping, going back, and typing over them.

- You can automatically paginate and repeat running heads.
- You can automatically start a new line of text without hyphenating the last word in the previous line; and if you don't mind hyphenation, there are word processors that will do it for you.

All software suppliers offer a variety of word processing programs, from which only you can select the one that's best suited to your needs. When it comes to hardware, there are a few basic criteria you should consider if word processing is one of the main jobs you want your micro to do.

First of all, how much memory will you need? This relates directly to the number and length of the documents you will work with at any one time. Consider, too, the number of characters you'll be able to see per horizontal line of text. (Somewhat confusingly, this is referred to as the number of "columns"—i.e. vertical columns—of characters that can be accommodated from left to right of the display.) The minimum acceptable column size for word processing applications is 40; 80 is preferable, so you can see more of the document at one time.

Give special attention to the kind of peripheral equipment you choose. Word processing often involves many hours of time in front of the machine, in which case a special high-resolution monitor is preferable to an ordinary television screen. For storage, you'll likely want to use disk, or cassette. And, of course, you will need a printer. Again, there are many on the market. Depending on the kind of work you do, you may want one with high-quality ("letter-quality") print in one or more typefaces, or a simple dot-matrix printer may be sufficient. Some printers use only special, continuous-fold paper; others accept standard sheets in various sizes and configurations. It's best to decide which printer you'll use before buying the micro itself, since not all computers are compatible with all types of printers.

A·C·A·D·E·M·Y ON COMPUTERS

The ACADEMY ON COMPUTERS wants to thank the Hotline people from the participating stations who have given their time and expertise in helping to answer your questions about computers.

KCET—	Los Angeles, CA Michael Thomas
KET—	Kentucky Network William Strong
KPBS—	San Diego, CA David Poddig— Hotline Coordinator Sherie Dean Claudia Derwin Charlie Kovach David Mika Bob Milhalic Richard Quinlan
NETN—	Nebraska Network Dave Davies Chuck Havlicek
WGTE—	Toledo, OH Howard J. Moskowitz
WHA—	Madison, WI Gregg Ford
WMHT—	Schenectady, NY Stochos, Inc.
WNED—	Buffalo, NY William Bates George Campos William Hanley Wallace Kosinski Phillip Morey
WNET—	New York, NY Edward M. Belsky Bob Blumenblatt Gary Brooks Richard Calosso Joan Klingsberg
WXXI—	Rochester, NY Bill Burleigh Brad Huff Dick Krager Terry Lincoln Ron Male Todd Schreckler

Spreadsheets: A valuable business application for computers

by David Chesanow

If you are planning to use a personal computer in your business, a spreadsheet is essential software.

Let's say the source of your livelihood is brownies, which you bake in your own kitchen and sell to all the finest downtown restaurants and gourmet shops; you are subject to a number of variable costs: ingredients, labor, utilities, rent, transportation, packaging, etc. All of these variables must be figured into the price at which you sell each brownie.

Now what if the price of sugar goes up, or your assistant wants a raise, or the car you use to distribute the goods needs an overhaul. Conversely, what if there's a homemade-brownie boom and your customers double their orders, or what if you want to figure out the added profit you'll make if you raise the price per brownie by five cents? What if you expect your biggest competitor to fold within two months and you want to increase your output accordingly?

The primary use of an electronic spreadsheet is to show how changes affect your business. But that's not all: Spreadsheets can be used to make sales forecasts, keep track of inventory, log invoices and balance your checkbook, calculate your income tax, and enable you to determine whether it's wiser to buy your home or office building or to continue renting. There are many other uses.

The first widely-available spreadsheet for the microcomputer user was VisiCalc. "The Apple with VisiCalc started the personal-computer revolution," say Henry Horenstein and Eliot Tarlin in their book *ComputerWise* (New York: Vintage Books, 1983). While that may well be true, VisiCalc is no longer without its rivals. One of the newest and hottest being Lotus 1-2-3, an integrated software package. 1-2-3 is 1) an electronic spreadsheet; 2) an information management tool; and 3) a graph maker. VisiCalc is equipped with some thirty mathematical formulas for performing business calculations; 1-2-3 has fifty-five. Both can produce business graphics; but VisiCalc requires additional software in order to do so, 1-2-3 doesn't.

Remember, that by the time you go out to buy spreadsheet software there will undoubtably be new and advanced versions of both VisiCalc and Lotus 1-2-3. It is wise to ask your salesperson about the latest software packages that are available for your computer.

VisiCalc is produced by:
VisiCorp
2895 Zanker Road
San Jose, CA 95134
408-946-9000

Lotus 1-2-3 is produced by:
Lotus Development Corporation
161 First Street
Cambridge, MA 02142
617-492-7171

David Chesanow is a free-lance editor who has contributed to a variety of publications about computers.

Hints on Buying a Computer

Many of the participants of the ACADEMY ON COMPUTERS have called up their local public television station to ask: Should I buy my own personal computer? If so, which one should I buy? The ACADEMY is unable to answer these questions. We are not in the business of selling computers nor do we feel comfortable suggesting one brand or model of computer over another. But we do have some basic, common sense advice that may help you to make the decision.

We hope you'll agree that you don't have to own a computer to get a great deal out of the "Bits and Bytes" programs and the related print material. But if you *are* itching to get your hands on your very own keyboard, your participation in the ACADEMY ON COMPUTERS puts you ahead of most people who walk into a computer store. You have enough information to ask many of the right questions and evaluate the answers you receive. Don't be afraid to insist on trying several systems—both hardware and software—several times before making up your mind.

You have learned by now that it is the software that makes the difference in running a computer —not the hardware. Your choice of software depends, first and foremost, on *application*—what you want your computer to do for you. Individual manufacturers have developed particular expertise in the financial, word processing, educational, and recreational applications of home computer technology, including most importantly, the software that they distribute or that is most compatible with their equipment.

This means, quite simply, that you should choose the right tool for the job you want to do. If you have children, you want a system on which they can play games and, at the same time, teach themselves—a system that's colorful, easy to use, as nearly indestructible as possible, and probably one that accommodates the BASIC programming language. If you're a writer or run a small business, you probably don't care whether you can attach a joystick to your system; what you want is a word processing or financial planning package, a high quality printer, and a wide-column display. If you travel a lot, you may be attracted to a lightweight, portable unit, but if you intend to use it for many purposes, find out first if you need expensive additional components, and whether such components are even available.

After you have made some basic decisions about applications, it is time to research the hardware that you want to purchase. It's certainly true that different pieces of equipment can do different things. And even similar-seeming units in roughly comparable price ranges can often be significantly different. Compare features such as type of keyboard, size and quality of monitor display, storage capacity and mode, portability, and availability of compatible peripherals. Some systems are "bundled" (keyboard, central processing unit, monitor, disk drive, and even a selection of programs in one package), while others are "unbundled" (CPU sold separately, with independent selection of components).

Price is usually a factor, too. One complete personal computer system can cost less than a single software program for another. You may wish to start in a relatively modest way and add to the system as your needs become more sophisticated.

Most of all, though, start by knowing what you expect of your home computer. Is it "friendly" enough for a beginner? Is there a sufficient variety of software in your field that is available for, or compatible with it? Can you write your own programs for it? Does it offer room to grow?

The industry is growing tremendously, and manufacturers are turning out more systems, with more varied options, and more attractive software programs. Ironically, this increased choice makes your decision more difficult and time consuming. But it also lessens your chance of going disastrously wrong—and increases your chance of finding the system that's just right for you.

That's especially true if you go to a reputable dealer, with whom you establish a direct relationship for continued service, advice, and sales of hardware extras and new software. Ask questions until you're satisfied with the answers. It is also advisable to attend a few users' group meetings and talk to people who have already made the investment in a personal computer. And finally, read the materials presented in the ACADEMY ON COMPUTERS courseware package to help with your decision.

PBS Airs Computer Shows

If you have enjoyed the "Bits and Bytes" series, you may want to look for these other public television series about computers. Call your local public television station to find out if and when the shows will air in your community.

Bits, Bytes and Buzzwords

"Bits, Bytes and Buzzwords" is a contemporary American series that gives a thorough, no-nonsense introduction to computer programs and systems. The five half-hour shows, hosted by Jim Hartz, cover topics ranging from word processing, business packages, graphics to educational uses.

Producer: Power/Rector Productions
Inc. and Golden Gate
Productions
Funded by a grant from
CompuPro

A comprehensive book that supplements the material covered in the series is highly recommended.

Title: *Bits, Bytes and Buzzwords*
Author: Mark Garetz
Publisher: Dilithium Press
Price: $7.95 plus shipping and
handling
To order: Call 800-821-1000

Computers At Work: Concepts and Applications

"Computers At Work: Concepts and Applications" is designed to aid the viewer to understand computer-based systems and their applications. In this fifteen half-hour series the student will learn what computers are, how they work, and more importantly, how they are used to solve problems and meet needs in a wide spectrum of applications.

Producer: Mitchell Publishing, Inc.

The Computer Programme

"The Computer Programme" presents the basic concepts of computers and their applications in a straightforward, understandable manner and shows the effects that computers are having, and will continue to have, on all our lives. The ten half-hour programs each have a theme which is illustrated by looking at examples of computers at work in the real world, and by exploring the principles behind these applications.

Producer: BBC

Making the Most of the Micro

"Making the Most of the Micro" is the sequel to "The Computer Programme". The series includes 10 half-hour programs that are designed to teach a viewer how to use a microcomputer.

Producer: BBC

The New Literacy: An Introduction to Computers

"The New Literacy: An Introduction to Computers" is an up-to-date survey of electronic data processing, computer hardware and software systems, and developments that will provide the basis for further advancements in information processing. The twenty-six half-hour programs provide a comprehensive overview of the computer.

Producer: Southern California
Consortium for Community
College Television

Making It Count

"Making It Count" presents a broad overview of data processing concepts and problems. Heavy emphasis is placed on computer applications. There are twenty-three half-hour programs that cover a wide variety of topics including hardware and software, programming, data processing, etc.

Producer: Boeing Computer Services

In Print

For those of you who own the Commodore 64 computer we recommend a book that covers hooking up the computer, programming in BASIC, and advanced topics such as POKing the Text Screen. The book is written in standard, easy-to-understand language. It is a good substitute for the Commodore 64 Owners Manual. Look for this book in your local Commodore store.

Title: The Elementary
Commodore-64
Author: William B. Sanders
Publisher: DATAMOST
8943 Fullbright Avenue
Chatsworth, CA
91311-2750
213-709-1202
Price: $14.95

Explanation

In Newsletter #2, the mortgage program for the Commodore Pet and 64 computers contained a character that many of you Commodore users do not have on your keyboard. Lines 560 and 580 contain this character: V
Replace that character with your exponential sign. The manual that you received with your computer will tell you what key to type for exponents.

Technological Update

IBM Introduces the IBM PCjr

IBM's latest entry into the microcomputer market is the IBM PCjr. The Junior is a powerful computer that is easy to use. The features of the Junior include:

- 16 bit microprocessor
- 62-key cordless keyboard
- Individually programmable keys
- Advanced graphics and sound capabilities

The IBM PCjr can be purchased in either a 64k format or 128k format. For the store nearest you that sells the IBM PCjr, call (800) IBM-PCJR.

A New Apple—The Macintosh

The Macintosh is the new microcomputer from Apple. It is fast, easy to learn, and easy to use. The features of the Macintosh include:

- 32 bit microprocessor
- built-in 3½″ disk drive
- nine inch black and white video display
- polyphonic sound generator
- lightweight portability
- the Macintosh mouse

The Macintosh mouse is a mechanical device that allows the user to point to the object or function they want on the screen instead of using the keyboard as an input device. Apple introduced the mouse on the Lisa computer and that success encouraged them to include it with the Macintosh.

For an authorized Apple dealer nearest you, call (800) 268-7796. In Canada, call (800) 268-7769 or (800) 268-7637.

Questionnaire Mailing Schedule

The Correspondence Envelope contains Questionnaire #2, an answer sheet for Questionnaire #2, and a business reply envelope. The questionnaire is designed to test your understanding of the ideas and information presented in the "Bits and Bytes" programs and the ACADEMY ON COMPUTERS RESOURCE BOOK. In order for us to respond quickly to your questionnaire, we ask that you comply with the following schedule for submitting your answer sheet.

WEEK OF APRIL 8, 1984
(following program 12)—
Complete Questionnaire #2 and return Answer Sheet #2 in the business reply envelope provided for your convenience postmarked no later than *Sunday, April 22, 1984.*

A response will be sent to you within two weeks of the receipt of your answer sheet.

Certificates of Completion will be sent to all participants who complete both questionnaires.

REMEMBER—Please remember to write your Registration Number on the top of Answer Sheet #2. Thank you.

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Mortgage Program

The ACADEMY ON COMPUTERS is pleased to provide you with a computer program to figure your mortgage payments. And even if you don't have a mortgage, typing a program into your computer is a useful "hands-on" exercise. Programs like this can be found in dozens of magazines and newsletters. Since you must enter them yourself, they are a valuable and inexpensive form of software. In this issue we are providing versions for the Texas Instruments 99/4A, Atari 400 and 800 and IBM PC.

For the TI 99/4A

```
10 REM  MORTGAGE
20 REM  DW CHANTRY
30 REM   CONVERTED TO TI BY NICK BHASIN
40 REM  C=COMPOUNDS/YEAR
50 REM  IR=INTEREST RATE
60 REM  IX=INTEREST FACTOR
70 REM  P=PRINCIPAL
80 REM  PY=PAYMENT
90 REM  T=TIME
100 REM   MA=CURRENT MONTH
110 REM  MAIN PROGRAM
120 CALL CLEAR
130 INPUT "PRINCIPAL->":P
140 PRINT
150 INPUT "RATE %P.A.->":IR
160 PRINT
170 PRINT "2 COMPOUNDINGS/YEAR? (Y/N)"
180 C=2
190 PRINT
200 CALL KEY(0,W,Q)
210 IF (W<>78)*(W<>89)THEN 200
220 IF W=89 THEN 250
230 INPUT "THEN HOW MANY/YEAR?->":C
240 PRINT
250 INPUT "TIME-YEARS->":T
260 PRINT
270 IR=IR/100
280 GOSUB 450
290 GOSUB 470
300 Z1=PY
310 GOSUB 490
320 PY=Z1
330 PZ=Z2
340 CALL CLEAR
350 GOSUB 570
360 PRINT "DO ANOTHER MORTGAGE (Y/N)?"
370 CALL KEY(0,W,Q)
380 IF (W<>89)*(W<>78)THEN 370
390 IF W=78 THEN 420
400 CALL CLEAR
410 GOTO 130
420 CALL CLEAR
430 PRINT "GOOD-BYE!"
440 END
450 IX=((1+IR/C)^(C/12)-1)
460 RETURN
470 PY=(P*IX)/(1-(1+IX)^(-12*T))
480 RETURN
490 Z1$=STR$((Z1)+.005)
500 FOR J=1 TO LEN(Z1$)
510 IF SEG$(Z1$,J,1)<>"." THEN 560
520 IF J+2>=LEN(Z1$)THEN 530 ELSE 550
530 Z1=Z1+.001
540 Z1$=STR$(Z1)
550 RETURN
560 NEXT J
570 YA=0
580 MA=0
590 BA=P
600 FOR YA=1 TO (T)
610 GOSUB 640
620 NEXT YA
630 RETURN
640 GOSUB 800
650 GOSUB 840
660 GOSUB 800
670 GOSUB 900
680 FOR MA=1 TO 12
690 GOSUB 940
700 NEXT MA
710 PRINT
720 PRINT "YEAR->";YA
730 PRINT
740 PRINT "CONTINUE LIST OF";T;"YEAR(S)?"
750 CALL KEY(0,W,Q)
760 IF (W<>78)*(W<>89)THEN 750
770 IF W=78 THEN 360
780 CALL CLEAR
790 RETURN
800 FOR X=1 TO 28
810 PRINT "*";
820 NEXT X
830 RETURN
840 PRINT "PRIN $";P;TAB(15);"I-F";
        INT(IX*1000000)/100
850 PRINT T;"YEARS @";IR*100;"% IS $";
860 Z1=PY
870 GOSUB 490
880 PRINT SEG$(Z1$,1,J+2)
890 RETURN
900 PRINT
910 PRINT "M   INT      PRIN      BAL"
920 PRINT "-   ---      ----      ---"
930 RETURN
940 IA=BA*IX
950 PA=PY-IA
960 BA=BA-PA
970 Z1=MA
980 X=2
990 GOSUB 1110
1000 Z1=IA
1010 X=8
1020 GOSUB 1140
1030 Z1=PA
1040 X=17
1050 GOSUB 1140
1060 Z1=BA
1070 X=27
1080 GOSUB 1140
1090 PRINT
1100 RETURN
1110 GOSUB 1170
1120 PRINT TAB(X-(K));SEG$(Z1$,1,K);;
1130 RETURN
1140 GOSUB 490
1150 PRINT TAB(X-(J));SEG$(Z1$,1,J+2);;
1160 RETURN
1170 Z1$=STR$(Z1)
1180 K=LEN(Z1$)
1190 RETURN
```

For the Atari 400/800

```
10 REM MORTGAGE
20 REM DW CHANTRY
30 REM CONVERTED TO ATARI COMPUTER SERIES BY
40 REM DAVID J. LANGDON
50 REM C=COMPOUNDS/YEAR
60 REM IR=INTEREST RATE
70 REM IX=INTEREST FACTOR
80 REM P=PRINCIPAL
90 REM PY=PAYMENT
100 REM T=TIME
110 REM YA=CURRENT YEAR
120 REM MA=CURRENT MONTH
130 REM MAIN PROGRAM
135 DIM X$(1),Z1$(20),S$(40):REM SET UP STRINGS
136 S$="                                      "
140 ? "}"
150 REM SET UP HEADING
160 GOSUB 460:GOSUB 470
165 GOSUB 470:GOSUB 460
170 PRINT
180 ? :? "PRINCIPAL";
185 INPUT P
190 ? :? "RATE %P.A.";
195 INPUT R
200 ? :? "2 COMPUNDINGS/YEAR? N/Y ";:C=2
220 INPUT X$:IF X$<>"N" THEN 250
230 ? "THEN HOW MANY COMPOUNDINGS/YEAR ?";:INPUT C:GOTO 250
250 ? :? :? "TIME-YEARS";:INPUT T
260 ? "}"
270 REM CALCULATE INTEREST FACTOR
280 IR=IR/100:GOSUB 570
290 REM CALCULATE MONTHLY PAYMENT
300 GOSUB 560
310 REM NOW FIX 2 DECIMAL PLACES
320 Z1=PY:GOSUB 790:PY=Z1:PZ=Z2
340 REM CALCULATE MONTH BY MONTH
350 GOSUB 590
360 PRINT "}DO ANOTHER MORTGAGE? Y/N";
370 INPUT X$
380 IF X$="N" THEN 400
390 PRINT CHR$(125):GOTO 140
400 PRINT CHR$(125)
410 PRINT "  ALLRIGHT THEN...GOOD-BYE":FOR PA=1 TO 2000:NEXT I
430 END
440 REM HEADING
450 PRINI CHR$(125)
460 FOR X=1 TO 36:PRINT "*";:NEXT X:? :RETURN
470 PRINT "**",,,"    **":RETURN
480 ? :? "YEAR MONTH INTEREST PRINCIPAL BALANCE"
490 ? "---- ----- -------- --------- -------"
500 RETURN
510 PRINT "PRINCIPAL $";P," INIT ";(INT(IX*1000000))/100
520 PRINT T;"YEARS @ ";IR*100;"% IS $";:Z1=PY:GOSUB 790
530 PRINT Z1$(1,J+2);"PER MONTH"
540 RETURN
550 REM FORMULA
560 PY=(P*IX)/(1-(1+IX)^(-12*T)):RETURN
570 IX=((1+IR/C)^(C/12)-1):RETURN
580 REM MONTH BY MONTH
590 YA=0:MA=0:BA=P
600 FOR YA=1 TO T:GOSUB 610:NEXT YA:RETURN
610 GOSUB 460:GOSUB 510:GOSUB 460:GOSUB 480
620 FOR MA=1 TO 12:GOSUB 680:NEXT MA
630 PRINT "CONTINUE LISTING TO END OF ";T;"YEARS(S)?.Y/N";
640 INPUT X$
650 IF X$="N" THEN 360
660 ? CHR$(125)
670 REM MORTGAGE ARITHMETIC
680 IA=BA*IX:PA=PY-IA:BA=BA-PA
690 Z1=YA:X=4:GOSUB 760
700 Z1=MA:X=9:GOSUB 760
710 Z1=IA:X=18:GOSUB 770
720 Z1=PA:X=26:GOSUB 770
730 Z1=BA:X=37:GOSUB 770
740 PRINT
750 RETURN
760 GOSUB 830:? S$(1,X-(K+1));Z1$(1,(K+1));:RETURN
770 GOSUB 790:? S$(1,X-(J));Z1$(1,J+2);:RETURN
780 REM 2 DECIMAL POINTS
790 Z1$=STR$((Z1)+5.0E-03):FOR J=1 TO LEN(Z1$)
800 IF Z1$(J,J)<>"." THEN NEXT J
810 IF J+2>=LEN(Z1$) THEN Z1=Z1+1.0E-03:Z1$=STR$(Z1)
820 RETURN
830 Z1$=STR$(Z1):RETURN
```

For the IBM PC

```
10 REMMortgage, by DW Chantry, TVO
20 REMConverted for the IBM PC by M Wilson  83-11-29 22:35
30 REMc = Compounds per year
40 REMIr = Interest Rate
45 REMIx = Interest Factor
50 REMP = Principal
60 REMPy = Payment
70 REMT  = Time
80 REMYa = Current Year
90 REMMa = Current month
100 REM Main Program
110 CLS
120 REM Setup Heading on Display
130 GOSUB 340: GOSUB 350: GOSUB 350: GOSUB 350: GOSUB 340
140 LOCATE 2,6: PRINT "TVO Mortgage Program":LOCATE 3,6:PRINT "By DW Chantry"
142 LOCATE 4,6: PRINT "Modified for the IBM PC by M Wilson"
150 LOCATE 10,6:  INPUT "Principal                        ";P
160 PRINT TAB(6);:INPUT "Rate Percent Per Annum           ";IR
170 PRINT TAB(6);:INPUT "Compounded Semi-annually    N/-  ";X$
180 C=2: IF X$ <> "N" AND X$ <> "n" THEN GOTO 200
190 PRINT TAB(6): INPUT "Then how many compounds per year ";C: GOTO 210
200 REM
210 PRINT TAB(6): INPUT "Time in Years                    ";T
220 REM Calculate the interest factor
230 IR = IR / 100 : GOSUB 440
240 REM Calculate the monthly payment
250 GOSUB 430
260 CLS
270 REM Calculate month by month
280 GOSUB 460
290 CLS: PRINT "Do another mortgage? N/-"
300 GOSUB 610: IF X$ = "N" OR X$ = "n" THEN GOTO 320
310 CLEAR: GOTO 110
320 CLS: PRINT "Allright then..... Goodbye": FOR PA=1 TO 2000:NEXT PA: STOP
330 REM Headings Routine
340 FOR X = 1 TO 64: PRINT "*";: NEXT X: PRINT " ": RETURN
350 PRINT "**"TAB(63)"**":RETURN
360 PRINT "Year  Month      Interest         Principal            Balance"
370 PRINT "----  -----      --------         ---------            -------"
380 RETURN
390 PRINT "Principal ";USING "$##,######.##";P;:PRINT SPC(5)"Interest Factor =";
IX
400 PRINT T;"Years @";IR*100;"% is  - ";USING "$##,###.## Per Month";PY
410 RETURN
420 REM Formulae
430 PY = (P*IX)/(1-(1+IX)^(-12*T)):RETURN
440 IX = ((1+IR/C)^(C/12)-1):RETURN
450 REM Month By month
460 YA =  0: MA = 0 : BA = P
470 PRINT " ":GOSUB 340:GOSUB 390:GOSUB 340:PRINT "<Press ENTER to continue>";:G
OSUB 610:CLS:FOR YA = 1 TO T: GOSUB 480: NEXT YA: RETURN
480 GOSUB 360: FOR MA = 1 TO 12: GOSUB 530: NEXT
490 PRINT:PRINT "Continue listing to end of";T;" Year(s)?. N/-";
500 GOSUB 610: PRINT X$: IF X$ = "N" OR X$ = "n" THEN GOTO 290
510 CLS: RETURN
520 REM Mortgage Arithmetic
530 IA = BA * IX : PA = PY - IA: BA = BA - PA
540 Z1 = YA: X = 4: GOSUB 580
550 Z1 = MA: X = 11: GOSUB 580
560 PRINT TAB(16);USING "$##,###.##";IA;:PRINT TAB(34);USING "$##,###.##";PA;:PR
INT TAB(50);USING "$##,######.##";BA
570 RETURN
580 GOSUB 600:PRINT TAB(X-K) LEFT$(Z1$,K);:RETURN
590 REM Columning
600 Z1$ = STR$(Z1): K = LEN(Z1$): RETURN
610 X$ = INKEY$: IF X$ = "" THEN GOTO 610 ELSE RETURN
```

David Chantry, *a member of TVOntario's technical team and an enthusiastic computer hobbyist, has created the mortgage programs listed here.*